A new scale of science observations from the High Resolution Imaging Science Experiment for the Mars Reconnaissance Orbiter

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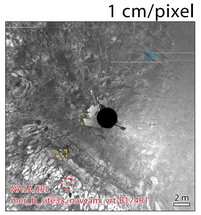
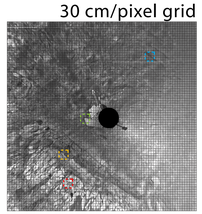
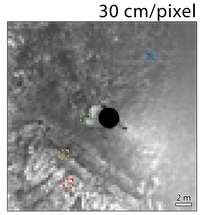
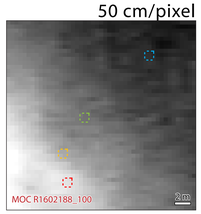
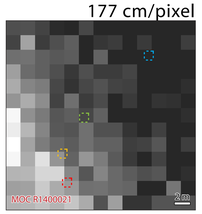
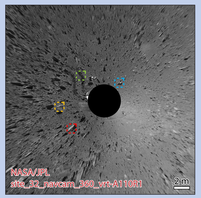
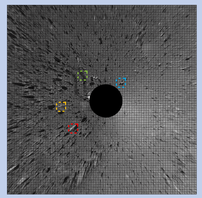
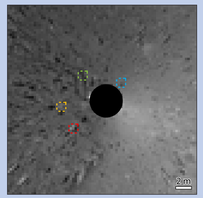
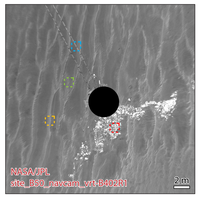
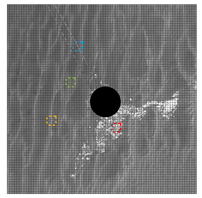
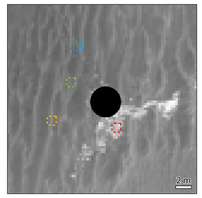
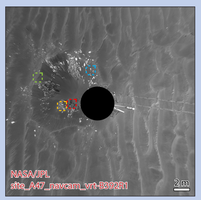
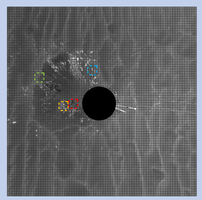
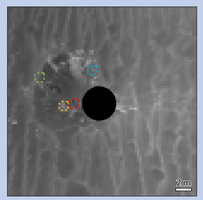
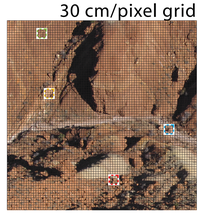
The High Resolution Imaging Science Experiment (HiRISE) aboard the Mars Reconnaissance Orbiter (MRO) will help to bridge the gap between high-resolution ground–based observations and globally distributed, orbiter-based imaging. HiRISE will foster high-impact scientific research by providing finer resolution imagery, within a broader context, than previously available for Mars.

1. Finer Resolution

	Ground-based observations: Mars Exploration Rovers		Nominal HiRISE resolution during MRO's Primary Science Phase	Orbiter-based imaging: Mars Orbiter Camera	
	1 cm/pixel	1 cm/pixel 30 cm/pixel grid	30 cm/pixel	50 cm/pixel	177 cm/pixel
Layers: Map-projected navcam imagery acquired by MER Opportunity in Endurance crater reveals the faulted and jointed stratigraphy of layered bedrock. Colored squares are 1 m x 1 m in width and show the smallest scales of features that are expected to be resolved by HiRISE. High-resolution MOC imagery of the same area (without the rover) establishes the resolution capabilities of current orbit-based observations. HiRISE observations of layered stratigraphy are expected to reveal details of decameter-scale depositional processes, faulting, and fluid flow.					
Boulders: MER Spirit's observations of rocks on the plains of Gusev crater shows the sizes of clasts that are expected to be resolved with HiRISE. Boulder-sized clasts >90 cm in diameter can be resolved. Resolution capability is also dependent on the contrast in albedo between the object and the background. HiRISE observations may help to improve size frequency distribution statistics for boulders and aid in landing site characterization.					
Dunes: Meter-scale dunes as observed by MER Opportunity on the plains of Meridiani Planum are expected to be resolvable with HiRISE. High-albedo materials along the crest of each dune sharply contrast with lower albedo materials within the troughs of each dune. In this way, HiRISE may potentially observe the migration of meter-scale dunes.					
Impact craters: This *c.* 10 m diameter impact crater observed by MER Opportunity is readily resolved at HiRISE's scale of observation. Albedo contrasts between materials within the crater and along the crater rim facilitate identification of this impact crater. HiRISE observations may help to refine population statistics for small craters down to a few meters in diameter.					
Earth analog: These images from the Upheaval Dome impact crater show how HiRISE's color capability can be used to aid in the identification of meter-scale features such as boulders, layering and gullies. Color will help to distinguish albedo variations from topographic shading. HiRISE's color capability also provides a link to multispectral observations by MRO's CRISM instrument.	*c.* 2 cm/pixel 	*c.* 2 cm/pixel 30 cm/pixel grid 	*c.* 30 cm/pixel 		

2. Broader Context

HiRISE's high spatial resolution is accompanied by a large swath width, nominally 6 km. At these image dimensions, kilometer-scale features such as drainage patterns, impact craters, bedrock layering, and faulting can be clearly discerned, and detailed high-resolution observations can be placed in this broader geologic context. The scene below of the Upheaval Dome impact crater, in southeast Utah, simulates the aerial extents of the panchromatic and color swaths for a typical HiRISE image.

3. An Everyday Example

The images below of Yerba Buena Garden, adjacent to the Moscone Convention Center, are displayed at 30 cm/px ground sampling dimension; identical to HiRISE. Objects in this scene provide a familiar context for visualizing the resolution capability of HiRISE.